# KANSAS IMPLEMENTATION PROCEDURES

# SURFACE WATER

*Prepared by The Kansas Department of Health and Environment*

*Bureau of Water*

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These written procedures provide a uniform mechanism for drafting National Pollutant Discharge Elimination System (NPDES) permits and Kansas Water Pollution Control permits to meet Kansas Surface Water Quality Standards in classified water bodies. These procedures also provide a uniform mechanism for implementing the antidegradation policy, as established at K.A.R. 28-16-28c(a), in all activities regulated by the state.

# I. Water Quality Standards

## A. Anti-Degradation

Applicable Regulations: 28-16-28b(a)
28-16-28c(a)

EPA's water quality standards regulations require States to adopt and implement an antidegradation policy containing the minimum requirements for such a policy. The antidegradation policy is a component of the Surface Water Quality Standards in the State's overall water quality program.

The intent of the antidegradation policy is to limit discharges and other activities that will negatively impact water quality, impair beneficial uses, or threaten to impair beneficial uses of surface waters. The antidegradation policy provides a baseline level of protection relative to established water quality criteria to all classified surface waters, and a higher level of protection to those waterbodies recognized as unique ecologically, highly valued for its resources, or having high water quality.

The federal antidegradation guidance presents three tiers for maintaining and protecting water quality and beneficial uses.

1. The first tier provides a "floor" which protects existing uses. Water quality must be preserved to protect and maintain those existing uses. Activities that would lower

water quality below levels necessary to maintain existing uses are prohibited.

2. The second tier provides protection to high quality waters where water quality exceeds the criteria associated with the assigned designated uses. Limited water quality degradation is allowed in high quality waters where the degradation is necessary to accommodate important social or economic development, but only if beneficial uses are still maintained. Public participation is required before allowing a lowering of water quality.

3. The third tier provides special protection for outstanding resource waters, such as those waters in National and State Parks, wildlife refuges, outstanding fisheries, and other waters of unique recreational or ecological value. Although activities that may create temporary reductions in water quality are allowed, any activities that would permanently lower water quality is these surface waters is forbidden.

Kansas provides protection to classified surface waters equivalent to the three tiers listed above in the Outstanding National Resource Water and General Purpose Water classifications described below. Additionally, Kansas provides a level of protection frequently referred to as tier 2½, to waters classified as Exceptional State Waters, also described below.

During development of a new permit, or when considering an increase in treatment capacity or discharge volume, or the discharge of additional pollutants to an existing permit, the Department will determine effluent limitations to maintain both the existing water quality conditions and also those necessary to maintain existing uses and achieve stream designated uses.

**1. Outstanding National Resource Water**

If the receiving surface water is classified as an Outstanding National Resource Water (ONRW), new or expanded discharges will not be allowed.

2. **Exceptional State Water**

If the receiving surface water is classified as an Exceptional State Water, the permit limits derived must provide protection to existing uses and existing water quality. Designated uses must be protected and maintained once a designated use is realized. Permit limits for discharges to Exceptional State Waters will typically require maintenance of existing water quality. Existing water quality may be lowered only if the Department determines that there is an important social or economic need to lower existing water quality, as demonstrated through the guidelines provided in EPA's guidance document "Interim Economic Guidance for Water Quality Standards, March 1995" (EPA-823-b-95-002).

3. **General Purpose Water**

If the receiving surface water is classified as a General Purpose Water, the permit limits derived must provide protection of existing uses (Tier 1 and Tier 2 waters). Where existing water quality in General Purpose Waters exceeds water quality criteria set forth in the regulations, the existing water quality will be maintained and protected (Tier 2 waters). Existing water quality may be lowered only if the Department determines that there is an important social or economic need to lower existing water quality, as demonstrated through the guidelines provided in EPA's guidance document "Interim Economic Guidance for Water Quality Standards, March 1995" (EPA-823-b-95-002).

However, if after satisfaction of public participation and intergovernmental coordination requirements, a determinationis made by the Department, based on important economic and social development of the area, degradation of existing water quality conditions in exceptional state waters or general purpose waters is acceptable and will maintain existing and attained designated uses, the lower water quality will be allowed. If a determination is made by the Department that a lowering of water quality is acceptable but will not preserve water quality conditions necessary to maintain designated uses, then KDHE may initiate a process for changing the designation as stated in K.A.R. 28-16-28d(c)(1).

When measurable surface water quality degradation is considered, the following statement will be included in the permit public notice:

> "This permit will allow a measurable increase in certain pollutant parameters above existing water quality, but not above concentrations necessary to maintain existing and designated uses (and if applicable ... and to protect designated critical habitat for threatened and endangered species)."

Public comment is invited during the permit public notice period for reconsideration or support of the Department action. In the event of significant public interest or concern, KDHE will conduct a public hearing on the proposed permitting action.

Certain activities, such as the construction, installation or maintenance of roads, bridges, pipelines, water intakes, dikes, levees or dams, may entail a temporary and localized lowering of surface water quality that would not, under normal circumstances, pose a significant long-term risk to the existing or designated uses of the impacted surface water. Such activities may be allowed by KDHE provided reasonable precautions (i.e., pollution control practices) are taken to minimize the impact of the activities on surface water quality.

Where an intentional or unintentional release of pollutants from a point source results in contamination or potential contamination of an alluvial aquifer that threatens to preclude attainment of the designated use of the alluvial aquifer or its associated surface water, the antidegradation provisions of the Kansas Surface Water Quality Standards shall apply.

Any new or expanded source of pollution subject to the interagency review provisions of the Kansas Environmental Coordination Act or Section 404 of the Federal Clean Water Act and requiring a permit, license, or certification from KDHE to discharge wastewater must undergo a formal certification review by KDHE. The certification will ensure that (1) the source of pollution will not violate any of the terms or conditions of the Kansas Surface Water Quality Standards or the Federal Clean Water Act and (2) all applicable minimum standards of design and minimum pollution control practices are used to minimize the impact of the pollution source on surface water quality.

KDHE may allow a new or expanded source of thermal pollution to discharge into a classified surface water provided that (1) the source of pollution meets all applicable technological effluent limitations and minimum standards of design, (2) the discharge will not violate any of the aquatic life support criteria of K.A.R. 28-16-28e(c)(2), and (3) any lowering of surface water quality resulting from the discharge is, in the judgement of the Director, necessary for the accommodation of important social and economic growth in the geographical vicinity of the discharge. KDHE will not allow any thermal pollution to discharge into any outstanding national resource water or to result in any harmful effects on populations of threatened or endangered species or critical habitat, as defined in the Federal Endangered Species Act (PL 93-205) as amended through October 7, 1988, or in K.S.A. 1991 Supp. 32-960 and K.A.R. 115-15-3.

Surface waters classified as Outstanding National Resource Waters are waters deemed, by the department or the public, to have high recreational or ecological value. These waters are generally located in national or state parks, federal or state game reserves, or are waters that are ecologically unique. KDHE classifies these waters as ONRWs to protect the extraordinary and uncommon nature of the ecosystems. KDHE acknowledges that there may be certain waters in the state that are deserving of this classification but have not yet been given the classification. KDHE encourages the public to take the opportunity to nominate waters it believes are deserving of the ONRW classification.

If the public believes there are certain waters that are deserving of reclassification, then the person(s) must contact KDHE in writing requesting the surface water be reclassified an ONRW. The request should state the exact location of the surface water and the resource, unique ecosystem, or special circumstances that justify the reclassification. KDHE will evaluate all available data and information to determine the chemical, physical, and biological integrity of the nominated surface water. Additional studies may be required before KDHE is able to determine if the surface water should be classified as an ONRW.

If KDHE concludes that a nominated surface water is deserving of the ONRW classification, then the public will have an opportunity to comment on the reclassification during a Public Notice period and, if enough interest or concern is raised, a public hearing will be conducted.

## B. Surface Water Classification

Applicable Regulations:28-16-28d(b)

### 1. Classified Streams

All streams with a mean summer base flow that exceeds 0.003 cubic meters per second are classified streams and a portion of those streams are listed in the Kansas Surface Water Register. Streams with flows less than 0.003 cubic meters per second mean summer base flow but provide important refuge for aquatic and semi-aquatic life are also classified streams.

### 2. Classified Lakes

All lakes managed by federal, state, county, or municipal entities and those private lakes used for public drinking water supply and open to the general public for secondary contact recreation, are classified lakes and a portion of those lakes are listed in the Kansas Surface Water Register.

### 3. Classified Wetlands

All wetlands managed by federal, state, county, or municipal entities, those wetlands classified as outstanding national resource waters, exceptional state waters, or designated as special aquatic life use waters, are classified wetlands and a portion of those wetlands are listed in the Kansas Surface Water Register. Those privately owned wetlands open to the general public for hunting, trapping, or other secondary contact recreational activities are also classified wetlands. Artificially created wetlands for wastewater treatment are not considered classified wetlands.

## C. Designated Uses

The Department will assign designated uses to state surface waters by conducting a use attainability analysis following the standardized procedures developed by the Department's Bureau of Environmental Field Services. A use attainability analysis may also be conducted by another party following the Department's standardized procedure. If conducted by a another party, the use attainability analysis must be submitted to the Department for review and approval.

### 1. Agricultural Water Supply Use

Surface waters used for agricultural purposes.

a. Livestock watering. Surface waters may be used for consumption of water by livestock.

b. Irrigation. Surface waters may be withdrawn and used for application onto crop land.

### 2. Aquatic Life Support Use

Waters used for the maintenance of the ecological integrity of streams, lakes and wetlands including the aquatic, semi-aquatic, or terrestrial species dependent on surface water for survival.

a. Special Aquatic Life Use. Surface waters that contain unique habitats or biota that are not commonly found in the state. Surface waters that contain populations of threatened or endangered species or are designated as high priority fisheries also may be designated as special aquatic life use waters.

If the receiving stream is designated as a special aquatic life use water, the permit limits derived will maintain existing uses and where attained, designated uses.

If the receiving surface water is designated by the State as critical habitat for threatened or endangered species, the permit limits derived will maintain water quality considered acceptable for continued propagation of the species and maintenance of its habitat.

b. Expected Aquatic Life Use. Surface waters that contain habitats or biota found commonly in the state.

c. Restricted Aquatic Life Use. Surface waters that contain biota in limited abundance or diversity due to the physical quality or availability of habitat compared to more productive habitats in adjacent waters.

**3. Domestic Water Supply Use**

Surface waters that are used, after appropriate treatment, for a potable water resource.

As used in these regulations, "point of diversion" is the location of a surface water intake structure used for domestic water supply or at the point of water removal from the alluvial aquifer by a well utilizing "groundwater under the influence of surface water" as defined under K.A.R. 28-15-11(cc).

4. **Food Procurement Use**

Surface waters that are used for obtaining edible aquatic or semi-aquatic life for human consumption.

5. **Groundwater Recharge Use**

Surface waters used for replenishing useable groundwater resources.

6. **Industrial Water Supply Use**

Surface water used for non potable purposes including cooling or process water.

7. **Recreational Use**

Surface water used for primary or secondary contact recreation.

a. Primary Contact Recreation. Surface waters used for recreational purposes where total body immersion is likely and inadvertent ingestion of water is probable. Swimming, boating, mussel harvesting, water skiing, skin diving, and wind surfing are examples of activities considered primary contact recreation.

b. Secondary Contact Recreation. Surface water used for recreational purposes where ingestion of surface water in not probable. Wading, fishing, trapping, and hunting are examples of activities considered secondary contact recreation.

## II. The Permitting Process

The discharge of pollutants from point sources to waters of the state is controlled via the issuance of discharge permits. These permits are referred to as Kansas Water Pollution Control Permits or National Pollutant Discharge Elimination System (NPDES) permits. These permits are issued jointly by KDHE and the Environmental Protection Agency. Wastewater permits for treatment facilities that do not discharge to surface waters of the state are referred to as non-overflowing, or non-Q facilities. These permits are issued solely by KDHE. Both discharge and non-overflowing permits are issued under the authority of K.S.A. 65-164 *et seq*. While discharge permits carry pollutant limitations on the effluent, non-overflowing permits do not, as there is not routine, ongoing discharge. Both types of permits may include schedules of compliance and special conditions to prevent, or eliminate pollution.

Permit limits for the discharge of effluent are based on meeting technology-based limits, water-quality criteria, or on best professional judgement (BPJ). Limits are imposed to protect existing uses, achieve designated uses, and limit degradation of existing quality of the waters of the state.

KDHE issues both General and Individual permits. General permits are developed to address particular categories of discharges with similar characteristics. Because the discharges have similar characteristics, they require the same effluent limitations, and permit conditions and sampling regimes.

General permits reduce paperwork, and permit issuance time due to the fact the general permit is placed on public notice one time. Once the general permit becomes final, an entity files a notice of intent (NOI) to discharge. If the applicant qualifies, the permit is issued without further public notice, with the previously approved conditions.

General permits are utilized by KDHE for the following categories of discharges: Stormwater, Hydrostatic Test Discharges from Pipelines and Storage Tanks Exposed to Crude or Refined Petroleum Products or Liquified Petroleum Gasses, and Non-Overflowing Wastewater Treatment Systems for a Hydrodemolition/Hydroblasting Project.

For discharges not covered by general permits, individual permits must be developed as follows:

## A. Development of Effluent Discharge Limitations

Development of effluent limitations involves a hierarchical process. The first step in the process involves the application of a minimum level of treatment for suspected pollutants or categories of pollutants. These limitations are established for certain categorical industries through effluent guidelines promulgated by EPA in 40 CFR Part 400, Subchapter N. The minimum level of treatment for municipal facilities is referred to as secondary treatment and is promulgated by EPA in 40 CFR, Part 133.

The second step in the process involves comparison of the technology-based limit from the first step to water quality based effluent limitations (WQBELs), or limitations established through a total maximum daily load (TMDL). The WQBELs are derived from application of the Kansas Surface Water Quality Standards (KWQS) and standards promulgated by EPA for the State of Kansas. The more stringent of the technology-based limitation, the WQBEL, or the TMDL limitation is used in the permit.

In those cases where there are no technology-based standards, or applicable water quality criteria, BPJ may be used in establishing permit limitations.

Kansas Statutes and Regulations essentially adopt the 40 CFR Part 125 permitting requirements. In general, the Federal regulations require that technology-based treatment requirements under section 301(b) of the Act represent the minimum level of control that must be imposed in a permit issued under section 402 of the Act.

### 1. Effluent Guidelines - Categorical Industrial Facilities

K.A.R. 28-16-57a adopts by reference 40 CFR Parts 405-436, 439, 440, 443, 446, 447, 454, 455, 457-461, 463, 465, and 469 Effluent Guidelines as in effect on July 1, 1985. This regulation prescribes effluent limitations guidelines for existing sources, standards of performance for new sources and pretreatment standards for new and existing sources pursuant to the Clean Water Act. The effluent guidelines include the following point source categories:

Asbestos manufacturing
Battery manufacturing
Builders' paper and board mills
Canned/preserved fruits/vegetables processing
Canned and preserved seafood processing
Carbon black manufacturing
Cement manufacturing
Coal mining
Coil coating
Dairy products processing
Electroplating
Electrical and electronic components
Explosives manufacturing
Feedlots
Ferroalloy manufacturing
Fertilizer manufacturing
Glass manufacturing
Grain mills
Gum and wood chemicals manufacturing
Hospital
Ink formulating
Inorganic chemical manufacturing
Iron and steel manufacturing
Leather tanning and finishing
Metal finishing
Metal molding and casting
Mineral mining and processing
Nonferrous metals manufacturing
Oil and gas extraction
Ore mining and dressing
Organic chemicals manufacturing
Plastics, and synthetics
Paint formulating
Paving and roofing materials
Pesticide chemicals
Petroleum refining
Pharmaceutical manufacturing
Phosphate manufacturing
Photographic
Plastics molding and forming
Pulp, paper, and paperboard
Rubber manufacturing
Soap and detergent manufacturing
Steam electric power generating
Sugar processing
Textile mills
Timber products processing

Most effluent guidelines are based on production rates. To calculate permit limits, effluent guideline values are multiplied by the facility's production rate. Consideration has to be given as to whether production rates will remain constant over the life of the permit. If not, tiered permit limits based on projected production levels may have to be incorporated into the permit.

2. **Secondary Treatment Requirements - Municipal/Commercial Facilities**

a. Mechanical Plants

i. Secondary treatment will be considered as a monthly average not to exceed 30 mg/l $BOD_5$ and 30 mg/l TSS, and a weekly average not to exceed 45 mg/l $BOD_5$ and 45 mg/l TSS. Secondary treatment also requires a pH value of 6.0 to 9.0. A $CBOD_5$ of 5 mg/l less than the $BOD_5$ limit is considered to be equivalent to a $BOD_5$.

ii. For trickling filters, secondary treatment will be considered as a monthly average not to exceed 45 mg/l $BOD_5$ and 45 mg/l TSS, and a weekly average not to exceed 65 mg/l $BOD_5$ and 65 mg/l TSS. Secondary treatment also requires a pH value 6.0 to 9.0. A $CBOD_5$ of 5 mg/l less than the $BOD_5$ limit is considered to be equivalent to a $BOD_5$.

b. Lagoon Systems

Secondary treatment will be considered as a monthly average of 30 mg/l $BOD_5$ (or 25 mg/l $CBOD_5$) and 80 mg/l TSS where treatment is solely provided by lagoons. *(See Appendix A*).

If a lagoon system is designed to the KDHE standard design criteria - three cells and 120-day detention or two cells and 150-day detention - the lagoon system permit will contain a requirement for annual monitoring of ammonia and fecal coliform bacteria. A study conducted by KDHE indicates that lagoon systems meeting the KDHE design criteria consistently produce effluent that meets or exceeds the criteria for ammonia and primary contact recreation (200 fecal coliform colonies/100ml) at the discharge pipe prior to mixing. Additionally, data provided by EPA Region VII indicates that 120-day detention lagoons will remove fecal coliform bacteria to less than one colony/100ml, or 200 times less than the primary contact recreation criteria. Therefore, monitoring will provide trend data indicating the point at which a lagoon system is beginning to fail.

Monitoring for ammonia and fecal coliform bacteria is also consistent with EPA Region VII permits issued on tribal lands in Kansas. Other EPA Regions do not require monitoring for either fecal coliform or ammonia.

If a lagoon system does not meet with KDHE's minimum standards of design, permit limits will be developed for ammonia and fecal coliform bacteria using the factors described in this section.

$BOD_5$ limits of 30 mg/l will also be established for lagoon systems meeting the KDHE design criteria. A study conducted by KDHE indicated that lagoon systems meeting the KDHE design criteria consistently discharge soluble $BOD_5$ at less than 10 mg/l. Lagoons, by nature, generate algae. Due to algae in the lagoon system effluent, EPA has approved total suspended solids limits of 80 mg/l on a monthly average in Kansas. In other states, the monthly average limit is even higher. Algae also exert an oxygen demand in the BOD test due to the fact BOD incubators are devoid of light. Without light, algae do not produce oxygen via photosynthesis. In the open environment of a surface water, algae would be exposed to sunlight and would produce oxygen to at least partially offset oxygen demand. Streeter and Phelps acknowledged this phenomenon in their classic model used to predict oxygen demand. They were unable, however, to quantify the oxygen production. Furthermore, since algae remain living organisms in the effluent that produce oxygen as well as demand oxygen, the exertion of maximum BOD (thus dissolved oxygen sag) typically will not occur at the same location in a receiving water as it will for soluble BOD. Finally, there is a lack of any monitoring evidence that discharge from properly designed lagoon systems have caused in-stream biological impacts due to dissolved oxygen depletion.

Therefore, based on facts that algae 1) algae add oxygen to a receiving water during daylight hours; 2) maximum oxygen demand occurs at a location in the receiving water that is different from maximum oxygen demand exerted by soluble oxygen; and 3) there is a lack of monitoring data tying discharge from properly designed lagoons to in-stream biological impacts, technology-based 30 mg/l $BOD_5$ limit will be used for lagoon systems that meet the KDHE design criteria.

3. **Water Quality Based Effluent Limits (WQBELs) - Municipal and Industrial Facilities**

Any discharge to waters of the state must meet limits that assure the Kansas Surface Water Quality Standards (KWQS) and EPA-promulgated standards will be met *(See Appendix B)*. The only exception is in the case of a variance being granted based on widespread socioeconomic impacts. The KWQS consist of definitions, classification of streams, use designations, narrative criteria, and numerical criteria. Desktop modeling is utilized to develop permit effluent limitations that assure compliance with the KWQS. Inputs into the modeling process include the following items:

a. Upstream Water Quantity

i. Seven-Day Ten Year Stream Flow (7Q10)

Alternate Low Flow

Applicable Regulations: 28-16-28b(ww)
28-16-28c(b)(3)
28-16-28c(b)(7)-(11)
28-16-28c(c)(1)

The default low flow utilized by KDHE to determine WQBELs is the hydrologically-based 7Q10 flow. Whenever possible, KDHE will assign a 7Q10 flow to a receiving stream on the basis of United States Geological Survey (USGS) stream flow gaging data. KDHE may, at its discretion, modify the assigned 7Q10 value to reflect gains or losses in flow occurring between the discharge of interest and the reference (nearest upstream or downstream) USGS gaging station. In the determination, KDHE may exclude stream flow data measured prior to construction of upstream flow control structures and exclude stream flow data measured prior to guaranteed stream flow rates based on water assurance district agreements. KDHE may also exclude data not representative of current flow conditions (i.e., increased interstate flows). For streams lacking an adequate USGS database, other sources of hydrological data (e.g., runoff yield maps or KDHE stream flow gaging data) may be used by KDHE in the estimation of 7Q10 flow. Streams classified as outstanding national resource waters, exceptional state waters, or designated as special aquatic life use waters with flows less than 0.003 cubic meters per second (cms) and lacking an appropriate hydrological database will be assigned a default value for 7Q10 flow of 0.003 cms; streams designated as expected aquatic life use waters or restricted aquatic life use waters with flows less than 0.03 cms and lacking an appropriate hydrological database will be assigned a default value for 7Q10 flow of 0.03 cms.

ii. Alternate Low Flow

Applicable Regulations: 28-16-28b(d)

28-16-28c(b)(9)

An alternate low flow must have a sound basis for its use. Examples include water assurance district guaranteed minimum low flows and flows based on allowable exposure frequencies and durations for species of concern. For instance, the most current available study on ammonia toxicity (EPA 1998) recommends utilizing a 30-day exposure period when determining ammonia limitations. Therefore, a thirty-day, ten year (30Q10) low flow will be used in determining ammonia limitations for the chronic ammonia criterion.

b. Pollutant Parameters

Effluent limitations are evaluated for those parameters the permittee identifies, or the permit writer believes has a reasonable potential to be found in the discharge. Background stream concentrations are derived from instream data collected through the KDHE stream water monitoring network. Otherwise, concentrations are extrapolated from the network data.

c. Reasonable Potential

Applicable regulation: K.A.R. 28-16-28e

Reasonable potential means the effluent from the facility normally does not exceed the WQBELs placed in the permit but because of variations in the effluent due to influent and treatment variability, it has a potential to do so.

KDHE uses the attached Reasonable Potential procedure developed by EPA Region VI with the modifications described in the letter accompanying the procedure. *(See Appendix C)*

d. Mixing Zones

i. Streams

Applicable Regulations: 28-16-28c(b)

In cases where the ratio of the receiving stream low flow to effluent discharge design flow listed on the permit is less than 3:1, the default mixing zone consists of 100% of the stream flow and a length of 300 meters. Chronic aquatic life criteria and all other criteria must be met at this point with the exception of drinking water criteria which must be met at the point of diversion. Where the ratio of the receiving stream low flow to effluent discharge design flow listed on the permit is greater than or equal to 3:1, the default mixing zone is 300 meters in length and:

- 25% of the stream flow for waters classified exceptional state waters, or designated special aquatic life use waters, and all recreational use waters. A 25% mixing zone will be applied to recreational criteria (fecal coliform bacteria) regardless of the aquatic life or other use designation.

- 50% of the stream flow for waters designated as expected aquatic life use waters.

- 100% if the stream flow for waters designated as restricted aquatic life use waters.

- In cases where surface waters with existing discharges are classified as Outstanding National Resource Waters, mixing zones will be allowed for those existing discharges for the term of the existing permit. No new discharges will be allowed after the reclassification. At the time of permit renewal or modification for an existing discharge permit, the mixing zone allocation for the existing discharge will be evaluated and the percentage of cross-sectional area or flow may be reduced or eliminated based on the new ONRW classification. The mixing zone evaluation will use available stream data, historical plant data, receiving stream and plant flows, and aquatic community health to determine whether a mixing zone and its size will be allowed in the renewed or modified permit.

In all cases, the implementation of the above mixing zone requirements, the mixing zone can be modified based on the proximity of downstream public drinking water intakes, swimming areas, boat ramp areas and mouths of classified stream segments as well as the overlapping of mixing zones, or when using best professional judgement significant environmental impact or public health concerns are noted from the unmixed effluent. In these situations, the mixing zone will be reduced.

Mixing zones may also be modified based on the use of alternate low flows, or studies which support the use of a modified mixing zone which may incorporate methods outlined in EPA's Technical Support Document for Water Quality-based Toxics Control.

A zone of initial dilution (ZID) contained within the boundaries of the mixing zone may be granted for some discharges. The ZID can comprise no more than 10% of the volume of the mixing zone immediately below the discharge point. The zone of initial dilution is the area within the mixing where both acute and chronic aquatic life criteria may be legally exceeded. Where mixing zones are not allowed, a zone of initial dilution is prohibited. The Department also reserves the right to prohibit a zone of initial dilution, based on site-specific conditions, where a mixing zone has been granted.

ii. Lakes

Applicable Regulation: 28-16-28c(b)(13)

Mixing zones within lakes classified as outstanding national resource waters, in K.A.R. 28-16-28b(mm), exceptional state waters, in K.A.R. 28-16-28b(w) or as special aquatic life use waters in K.A.R. 28-16-28d will be prohibited by KDHE. Although mixing zones may be permitted in other classified lakes (expected or restricted aquatic life use waters), KDHE will require permit applicants to comply with the physical limitations for mixing zones set forth in K.A.R. 28-16-28c(b)(13). Evidence obtained through field studies, dispersion modeling analyses or other appropriate methods will be considered by KDHE during the permitting procedure.

Whenever possible, estimates of lake volume at conservation pool will be based on data provided by the official lake planning or administrative authority (e.g., U.S. Army Corps of Engineers, Bureau of Reclamation, Natural Resources Conservation Service, Kansas Department of Wildlife and Parks). When lake volumetric data is unavailable or of questionable accuracy, the permit applicant will be encouraged to conduct appropriate morphometric and hydrological surveys to provide KDHE with a scientifically defensible estimate of conservation pool volume. A mixing zone within a classified lake will not exceed more than one percent of the lake conservation pool volume.

iii. Wetlands

Applicable Regulation: 28-16-28c(b)(14)

Mixing zones within classified lacustrine or palustrine wetlands will be prohibited by KDHE owing to the relatively slow circulation and limited mixing of these waters. At a minimum, effluent discharged into a classified wetland must meet all applicable aquatic life support, water supply, food procurement, and recreational criteria prior to contact with the receiving water unless the wetlands are utilized as part of a wastewater treatment process, or where site specific criteria apply.

e. Permit Limit Derivation

Applicable Regulations: K.A.R. 28-16-28c
K.A.R. 28-16-28d
K.A.R. 28-16-28e

i. Disinfection

In the 1994 Water Quality Standards, KDHE designated all classified streams for non-contact recreation *(now secondary contact recreation)* and in the 1994 Kansas Water Quality Register some streams and stream segments for contact recreation *(now primary contact recreation)*. Some of these designations are not based upon current Use Attainability Assessments and are subject to best professional judgement based on very limited data.

In areas of downstream high population density (urban streams), KDHE will use best professional judgement and the authority of Kansas Statute 65-171(d) and K.A.R. 28-16-28c(d)(2) will routinely require continuous (year-round) disinfection for public health protection.

In surface waters where downstream primary contact recreation has been determined as a probable use and in urban streams, wastewater effluent limitations of 200 organisms per 100 milliliter sample per month geometric average will be required at the edge of the mixing zone of all dischargers having wastewater originating from human or animal waste. Also, for primary contact recreation use, no samples can exceed 900 colonies per 100 milliliters.

The Department will consider receiving stream dilution and fecal die-off when considering requiring disinfection of a discharge into a receiving stream segment above a designated primary contact recreation site. Also, the Department will consider receiving stream dilution and upstream fecal coliform count when developing effluent limitations for fecal coliform discharges into streams designated for secondary contact recreation.

Where chlorine or any other halogen is used as the disinfectant, dechlorination (dehalogenation) will be required. In some cases, the water quality-based effluent limitations for chlorine are not quantifiable using EPA approved analytical methods. KDHE has determined the current acceptable quantification level for total residual chlorine to be 100$\mu$g/l. The permittee will conduct the analyses in accordance with the method specified and will utilize a standard equivalent to the minimum detection level. For reporting purposes, actual analytical values will be reported. Measured values above the quantification limit or the permit limit, whichever is higher, will be considered violations of the permit. Values below the quantification limit will be considered to be in compliance with the permit limitation and as zero (0) when utilized in any subsequent calculations. The quantification threshold does not authorize the discharge of chlorine in excess of the water quality-based effluent limits stated in the permit.

ii. Metals

Applicable regulation: K.A.R. 28-16-28e

Tables 1a and 1b of the referenced regulation provide instream water quality-based limits for certain metals based upon the surface water designated use categories. KDHE routinely conducts compliance monitoring studies on the effluent from discharging wastewater treatment facilities at a frequency based upon the size and nature of the wastewater treatment facility, the type of industrial contributors to the facility and the characteristics and designated uses of the receiving stream. Major discharging wastewater treatment facilities (≥1 MGD) and minor discharging wastewater treatment facilities (<1 MGD) with pretreatment contributors are generally monitored once a year. Part of this compliance monitoring involves determining the concentrations of the pollutant metals listed in Table 1a in the wastewater treatment plant effluents.

Upon request, or during the permit renewal period, the KDHE will calculate an allowable concentration in the wastewater treatment facility effluent for each of the metals listed in Appendix B. Permit limits will be expressed as Total Recoverable Metals.

Parameters are:

- Metal Limits in the receiving stream: Use the data in K.A.R. 28-16-28e, Table 1a or the equations in Table 1b as appropriate.

- Hardness (as CaCO3): Use the 90th percentile stream values as measured. If insufficient, use data from similar streams and near the subject location.

- Stream Flow: Use low flow.

- Effluent Flow: Use design flow from the NPDES permit, or flow as requested on the permit application.

- Receiving Stream Background Metals Data: Use the 50th percentile of measured stream values. Use zero for all values reported below the minimum detection limit.

- Effluent Metals Data: Use measured data. Use zero on all values reported below the minimum detection limit.

The effluent metals limits as calculated are compared with metal concentrations determined during compliance monitoring using the Reasonable Potential procedure discussed in Section II.A.3.a. of this document.

iii. Five-day Biochemical Oxygen Demand ($BOD_5$)
Applicable regulation: K.A.R. 28-16-28e(c)(2)(A)

Five-day Biochemical Oxygen Demand ($BOD_5$) is calculated utilizing a modified Streeter-Phelps equation. The calculations are performed in an iterative manner until the effluent $BOD_5$ of a discharge produces an in-stream reduction of dissolved oxygen concentration of not less than 5.0 mg/l.

iv Ammonia
Applicable regulation: K.A.R. 28-16-28e(d) table 1c

If a finding is made and approved by the Department for a site or ecoregion that identifies a time of year when no sensitive life stages of fish species are ordinarily present in numbers affecting the sustainability of populations, the criterion applicable to that time of year may be set up to 3-fold higher than the criterion applicable to the remainder of the year. Where future research reveals that other vertebrate or invertebrate species are sensitive to chronic concentrations of ammonia, the Department will consider those newly identified species or life stages in setting alternate site or regional criteria. Baseline and subsequent biological monitoring in accordance with currently available EPA guidance should be conducted to assure that the integrity of the aquatic community being protected is maintained when these higher cold-season concentrations are allowed.

v. Other parameters

Limitations for other pollutant parameters are developed utilizing steady state dilution modeling. For modeling purposes, actual background concentrations for the parameters in question are utilized where available.

f. Whole Effluent Toxicity

i. Species

Acute and chronic toxicity testing of discharges will use invertebrate and vertebrate species. Acute invertebrate toxicity testing will be conducted on any of the following daphnid species:

*Daphnia Pulex*
*Daphnia magna*
*Ceriodaphnia dubia*

Chronic invertebrate toxicity testing will be conducted on *Ceriodaphnia dubia* unless an alternate species is approved by KDHE.

Vertebrate toxicity testing will be conducted on the fathead minnow *Pimephales promelas*.

ii. Acute toxicity

Procedures for toxicity testing will be in conformance with the EPA publication titled "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms", fourth edition, August, 1993. Monitoring and effluent limitations for acute toxicity, as defined under 28-16-28b(o), will be included in permits using the following criteria:

- All KDHE-defined major discharging wastewater treatment facilities, except those facilities classified as majors because of non-contact cooling water, will be required to conduct, as a minimum, an annual acute toxicity monitoring test on a representative sample of the wastewater effluent. KDHE will utilize BPJ to determine if more frequent toxicity testing is appropriate.

- KDHE will utilize best professional judgment to determine when other wastewater treatment facilities will be required to conduct acute toxicity monitoring. In this determination, KDHE will consider the size and type of industrial contributions to the wastewater system, previous toxicity testing results, the potential causes for the toxicity, the relative size and use designation of the receiving surface water body, and information from stream studies.

- Whenever results from two consecutive or any two of four consecutive acute toxicity tests indicate the effluent is more toxic than levels established in the permit, and the cause for the toxicity is not apparent, the permittee will be required to conduct at least quarterly acute toxicity tests for one year. Results from KDHE labs, EPA labs, and KDHE certified labs are acceptable. If the results of additional toxicity tests indicate no acute toxicity at the edge of the zone of initial dilution, the testing frequency will be returned to previous levels. If acute toxicity continues, at least quarterly testing will continue and the permittee will be required to conduct a

Toxicity Inventory Evaluation (TIE) in accordance with EPA guidance to attempt to determine the source and type of toxicity being discharged. KDHE may require a toxicity inventory evaluation at any time during the additional testing. The toxicity will need to be eliminated through a Toxicity Reduction Evaluation (TRE).

iii. Chronic Toxicity

Procedures for chronic toxicity testing will be in conformance with the EPA publication titled "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms", second edition, March, 1989.

Monitoring and permit limit requirements for chronic toxicity, as defined under K.A.R. 28-16-28b(p), may be included in permits using the following criteria:

- When the allowable median lethal concentration calculated at the edge of the zone of initial dilution exceeds 100%, a chronic toxicity test may be utilized. This situation can occur where the stream mixing zone dilution is small in comparison to the facility discharge volume.

- When significant environmental damage is determined through in-stream bioassessment procedures in a classified surface water flowing at or above low flow conditions as defined in K.A.R. 28-16-28c(c)(1), and the damages are believed to be caused by a wastewater discharge, even though no acute toxicity is detected in the wastewater effluent, a chronic toxicity test may be utilized.

- Whenever results from two consecutive or any two of four consecutive chronic toxicity tests indicate the effluent is more toxic than levels established in the permit, and the cause for the toxicity is not apparent, the permittee will be required to conduct at least quarterly chronic toxicity tests for one year. Results from KDHE labs, EPA labs, and KDHE certified labs are acceptable. If the results of additional toxicity tests indicate no chronic toxicity at the edge of the mixing zone, the testing frequency will be returned to previous levels. If chronic toxicity continues, at least quarterly testing will continue and the permittee will be required to conduct a Toxicity Inventory Evaluation (TIE) in accordance with EPA guidance to attempt to determine the source and type of toxicity being discharged. KDHE may require a toxicity inventory evaluation at any time during the additional testing. The toxicity will need to be eliminated through a Toxicity Reduction Evaluation (TRE).

### 4. Best Professional Judgement

For pollutants where there are no effluent guidelines, or where there are no water quality criteria, best professional judgment (BPJ) may be used in developing permit limitations.

## B. Administrative Permit Issuance

### 1. Certification Procedure

Applicable regulation: K.A.R. 28-16-28f(c)

KDHE will issue a water quality certification for any actions taken by the department as described in K.A.R. 28-16-28f(c)(1) through (4).

For major wastewater treatment facilities required to have a federal license or permit pursuant to the federal clean water act, the department will certify the actions via the Fact Sheet and the permit. The Fact Sheet will contain the certification statement and summarize the supporting documents used to develop the permit limits and conditions.

For minor wastewater treatment facilities required to have a federal license or permit pursuant to the federal clean water act, the department will certify the actions via the Statement of Basis form and the permit. The Statement of Basis form will contain the certification statement and summarize the supporting documents used to develop the permit limits and conditions.

For other minor treatment facilities required to have a State permit but not a federal license or permit, KDHE will certify the actions via a KDHE Review Checklist and a Kansas Water Pollution Control permit.

For other actions taken by the department as described in K.A.R. 28-16-28f(c)(1) through (4), KDHE will issue a water quality certification within the documents approving the action.

**2. Parameter Monitoring, Limits, and Frequency**

Applicable regulation: K.A.R. 28-16-28e

a. Parameter Monitoring

The Kansas Water Quality Standards (KWQS) provide a list of parameters with in-stream water quality limitations (criteria). In addition, the general narrative criteria state that surface waters will be free from the harmful effects of substances that originate from artificial sources of pollution and produce any public health hazard, nuisance condition, or impairment of designated use.

Many of the potential pollutants listed in the tables of the KWQS are used almost exclusively in specialized industries and are generally attributed to those industries. Other potential pollutants are easily volatilized, treated, chemically bound, or eliminated from the water. Still others, such as toxaphene and DDT, are banned from production and use and only "leftover" quantities appear infrequently in the influents to wastewater treatment facilities. Therefore, it is neither cost effective nor necessary to measure for every regulated parameter in the KWQS tables. KDHE places in each permit, requirements to monitor certain parameters based upon the likelihood that the parameters are present in concentrations which exceed the KWQS criteria. KDHE may require pollutant scans and/or whole effluent toxicity testing to determine the presence of a class of pollutants or the overall effect of the effluent on aquatic life. KDHE will evaluate the type of service area and treatment plant, plant design flows and actual flows, the ratio of receiving a stream flow rate relative to the effluent flow rate, stream designated uses, pollutant characteristics, the industrial contribution, and the pre-treatment practices of the contributing industry, in determining if whole effluent toxicity testing or pollutant scans requirements are needed in the permit.

b. Parameter Limits

Parameter limits are generally set by technology-based criteria, categorical standards criteria, or Water Quality Standards criteria. The limits are based upon the receiving stream's designated uses, plant design flow, water quality assessment effluent flow, receiving stream flow, historical plant and receiving stream data, and employment of modeling formulas with these data. However, in an increasing number of cases, the permit limits, as calculated, are below the minimum detection limit (MDL) of the approved methods outlined in 40 CFR Part 136. In these cases, KDHE will place the limit, as calculated, in the permit with a notation similar to:

"* This limit is below the minimum quantification level of _____ (units) for this parameter using any suitable approved test method in 40 CFR Part 136. This requirement shall be satisfied by a measurement of _____ (units) or less when using (test method or instrument approved by 40 CFR Part 136). The quantification threshold does not authorize the discharge of (parameter) in excess of the water quality-based effluent limit stated in the permit."

c. Parameter Testing Frequency

The frequency for which a parameter is tested is dependent upon many factors such as the flow rate and type of treatment facility, the receiving stream designated uses, the receiving stream flow rate relative to the effluent flow rate, the toxicity and likely presence of the parameter, potential for episodic flows with higher than normal concentrations of the parameter, operating history of the facility, amount and quality of available data, amount and type of industrial contributors to the collection system. A suggested testing frequency follows*:

| **Facility Flow Rate** | **General Testing Frequency*** |
|---|---|
| Quarries & Similar | Monthly to Semi-Annual |
| Small 120 Day Lagoons | Quarterly |

**Mechanical Plants and Large Lagoons**

| | |
|---|---|
| >0 to 1.0 MGD | Monthly |
| 1.0 to 2.5 MGD | Twice Monthly |
| 2.5 to 5.0 MGD | Four Times Monthly |
| 5.0 to 10.0 MGD | Twice Weekly |
| 10.0 to 20.0 MGD | Three Times Weekly |
| 20.0 to 40.0 MGD | Every Other Day |
| 40.0 MGD and above | Daily |

* Suggested testing frequency is for routine parameters. The permit writer may use BPJ to appropriately increase or decrease the testing frequency as necessary to satisfy the regulatory requirements for each permit.

Testing frequency may also be increased or decreased based on historical performance of the treatment facilities.

3. **Background Concentrations**

Applicable regulation: K.A.R. 28-16-28e (b)(9)
K.A.R. 28-16-28e (c)(3)(B)

In surface waters where naturally occurring concentrations of elemental substances such as chlorides or sulfates exceed the numeric criteria given in Tables 1a, 1b, and 1c in the KWQS, the newly established numeric criteria will be the background concentration in the receiving water. Background concentrations applied as criteria will be determined only for those substances incorporated into surface waters that are released from geologic deposits and formations as a result of erosional processes or groundwater intrusions.

The background concentration of a receiving water may be established using data from STORET or data from other data bases with adequate and documented quality assurance procedures acceptable to KDHE. The background concentration will be determined using existing instream chemical parameter measurements and stream flow measurements. Background concentration will be determined using the mean concentration of instream measurements. Only those measurements gathered when stream flow is at or below $50^{th}$ percentile of all stream flow values will be used to determine background concentrations. A minimum of five data points will be required to make a background concentration determination. If sufficient data is not available, then the background concentration will be established through monitoring. Samples will be collected in upstream areas representative of the receiving water, including various habitat types, and unaffected by the discharge being permitted, or other identifiable anthropogenic influences. Samples from streams will be collected as close as possible to low flow conditions. Samples from lakes will be collected outside of the regulatory mixing zone. The mean of at least five concentration observations is required to establish the background concentration. Hardness and pH data should also be gathered if the criterion is hardness or pH dependent.

4. **Compliance Schedules**

Applicable regulation: K.A.R. 28-16-28f(d)

Compliance schedules are placed in permits when the permittee is unable to comply with water quality requirements or special conditions. Interim and final limits are placed in the permit with monitoring normally required for the parameters for which the compliance schedule was developed.

5. **Narrative Criteria**

Applicable regulation: K.A.R. 28-16-28e(b)

Narrative criteria are implemented through the application of permit limits for individual pollutants and Whole Effluent Toxicity testing for combinations or unidentified toxic substances. Narrative criteria are also implemented through standard language placed in NPDES permits.

6. **Site-Specific Criteria**

Applicable regulation: K.A.R. 28-16-28f(f)

A site-specific criteria determination can change the water quality aquatic life criteria for a parameter(s) in a given stream segment. A change in criteria based on a site-specific determination will not be granted to allow technology-based limits to be exceeded. A schedule of compliance in the permit will be required where technology-based limits are exceeded.
The discharger requesting a site-specific determination from the criteria set via K.A.R. 28-16-28e must specifically state, in writing to KDHE, the parameters for which a site-specific determination is being sought. The request must include the scope, content and time frame for a study to gather data in support of the site-specific determination being requested.

The site-specific determination study must be conducted in accordance with one of the three methods outlined in USEPA's Interim Guidance on Determination and Use of Water Effect Ratios for Metals, EPA-823-B-94-001, or other acceptable methods (background concentration determination or winter time ammonia criteria). The study may also provide supporting data establishing the chemical, physical and biological condition of the receiving water, including the number, diversity, and health of the biological resources in the stream. Studies to make a site-specific determination may also use guidelines provided in EPA's Technical Support Document for Water Quality-based Toxics Control.

KDHE will require the study be conducted by persons skilled in developing the information required in the site-specific determination report. Such skills will include appropriate techniques for conducting the approved EPA methods and relevant biological studies. KDHE approval of the scope, content, and time frame of the study is required.

KDHE will conduct a forum for the public to participate in the establishment of site-specific aquatic life criteria. KDHE will invite interested parties, regional experts, and the general public to assist in the construction of the scope and content of any studies used for support or development of site-specific criteria. The public will also be invited to comment on proposed criteria through the public notice process and if deemed necessary, through a public hearing.

Normally, KDHE will allow 12 months to gather the necessary data and three additional months to assimilate and present the report. This time frame may be extended or reduced based upon the complexity of the study, weather induced delays and other contingencies outside the control of the discharger. During this time, monitoring requirements will be placed in the permit for the parameters which will be affected by the site-specific determination. The requirements in the original permit issued prior to allowing the site-specific criteria study will remain in effect until the permit is renewed or until a final decision is made on the site-specific criteria request.

The decision and appropriate permit modifications will be public noticed and subject to review and appeal. If the request to change the site-specific criteria is not granted and the permittee is unable to meet the required limitations, the permit will be modified with a schedule of compliance.

### 7. Variances

Applicable regulations: K.A.R. 28-16-28f(e)

A variance is a mechanism that allows a delay in compliance for the stream segment and specific water quality parameters for which the variance is granted. A variance does not change the receiving stream designations or the level of protection to be afforded the stream. A variance should only be requested when compliance with a water quality criteria will have substantial and widespread socioeconomic impact. A variance cannot be granted which would result in effluent limitations above technology-based limits. A variance is granted, at a maximum, for the time period of the NPDES permit. A variance allows effluent limitations for certain pollutants, and parameters above the water quality-based limitations necessary to satisfy the criteria set via K.A.R. 28-16-28e.

The person requesting a variance from the criteria set via K.A.R. 28-16-28e(c) must specifically state, in writing to KDHE, the parameter(s) for which a variance is being sought. The request must also include the scope, content, and time frame for a study justifying the variance. KDHE approval of the scope, content and time frame of the study is required. The study must be conducted by a person, or persons, skilled in developing the types of information required in a variance study. Such skills will include appropriate financial knowledge, engineering cost estimating, and user charge development.

The variance procedure shall follow the EPA Guidance Document titled "Interim Economic Guidance for Water Quality Standards, March 1995" (EPA-823-b-95-002).

The decision and appropriate permit modifications shall be public noticed and both the decision and the modified permit shall be subject to review and appeal. If the variance is not granted, the permit will be modified with a schedule of compliance.

## 8. Public Notice

Public notice and hearings on actions concerning these regulations shall be in accordance with K.A.R. 28-16-61. K.A.R. 28-16-61, among other things, adopts 40 CFR Part 124.10(c)(1)(i),(ii),(iii), and (iv) which requires notification of pertinent government agencies in regards to proposals for draft NPDES permits. KDHE sends copies of all public notice documents to all agencies identified in the Water Projects Environmental Coordination Act (K.S.A. 82a-326).

Public notice of state-wide concerns is published in the Kansas Register and daily newspapers across the state. Regional and local issues are public noticed in the Kansas Register and regional and/or local daily and/or weekly newspapers based upon circulation of the newspaper and/or status as the official newspaper for the entity.

## 9. Permitting Issuance

The permitting process used by the Bureau of Water is shown in the flow schematic in Appendix D. The two primary categories of permits are the National Pollutant Discharge Elimination System (NPDES) permits which are joint federal/state permits for overflowing (discharging) facilities and Kansas Water Pollution Control permits which are Kansas-only permits for non-overflowing (total retention) facilities. Both types of permits are given state permit identification numbers. Only the joint federal/state permits have federal identification numbers. All wastewater treatment facility permit numbers are assigned by KDHE.

The only significant difference in the way the two types of permits are processed is the federal/state permits require a surface water quality assessment while the non-overflowing state permits do not require such an assessment since no treated wastewater is discharged to surface waters of the state or the United States.

For federal/state facilities required to have a federal license or permit pursuant to the federal clean water act, the initiating KDHE section will request a water quality assessment from the appropriate KDHE section via the Water Quality Assessment form. Comments and data provided on, or with the WQA form, the available stream data, current regulations, and other applicable standards will be reviewed to determine appropriate parameters and limitations for the effluent from the wastewater treatment facility. The initiating section will review the calculated parameters and limitations and determine, based upon characteristics of the effluent, the parameters which are likely to be present and, if a Reasonable Potential to exceed the proposed limits exists. If the parameters have technology based or categorical limits or if Reasonable Potential exists, parameter limits will be placed in the permit. If Reasonable Potential does not exist, limits on that parameter will not be placed in the permit. If insufficient data is available to conduct a reliable Reasonable Potential calculation, monitoring for the parameter may be required. Such circumstances are discussed in the Reasonable Potential section of these Implementation Procedures.

After permits have gone through the approval process, they are dated (effective date and expiration date) and signed by the Secretary of the Kansas Department of Health and Environment.

Permits can be effective for up to five years. Permits are currently being assigned to expire in certain years, according to the drainage basin to which they discharge or, for a non-overflowing facility, where they are located. During this transition some permits may expire in two to four years instead of the normal five years. KDHE will conduct a basin-wide water quality study prior to the year during which the permits in that basin expire to determine if any of the monitored pollutants exceed the water quality standards criteria. If the water quality standards are exceeded and are caused by artificial sources, the sources will be identified and a wasteload allocation to each source (point and/or non-point) shall be assigned to reduce the pollutants, to meet the water quality standards.

The Department may also require a shorter permit effective time where pollutants of concern are expected but data is not adequate to determine Reasonable Potential and/or there is a need to upgrade the treatment process.

In general, the effective and expiration dates shall be at or near the end or beginning of a month so as to avoid confusion when changes occur between the old and new permit. New permits on quarterly monitoring schedules shall be routinely assigned quarterly reporting months of April, July, October and January.

A flow schematic of the permitting process is included in Appendix D.

# Appendix A

## Lagoon Solids Limits

NOVEMBER 13, 1978

PART IV

federal register


# ENVIRONMENTAL PROTECTION AGENCY

## WASTEWATER TREATMENT PONDS

### Suspended Solids Limitations

[6560-01-M]

# ENVIRONMENTAL PROTECTION AGENCY

[FRL-1006-4]

## SECONDARY TREATMENT INFORMATION REGULATION

### Suspended Solids Limitations for Wastewater Treatment Ponds

On October 7, 1977, the Environmental Protection Agency (EPA) published in the FEDERAL REGISTER (42 FR 54666) a final amendment to the secondary treatment information regulation applicable to the suspended solids limitations for certain municipal wastewater treatment ponds. The secondary treatment information regulation, 40 CFR 133, contains effluent limitations in terms of biochemical oxygen demand, suspended solids and pH which must be achieved by municipal wastewater treatment plants.

The amendment added a new paragraph (c) to § 133.103 of 40 CFR 133. This allows a case-by-case adjustment in suspended solids limitations for publicly owned waste stabilization ponds, if: The pond has a design capacity of 2 million gallons per day or less; ponds are the sole process for secondary treatment; and, the pond meets the biochemical oxygen demand limitations as prescribed by 40 CFR 133.102(a). Ponds that are not eligible for this adjustment include: Basins or ponds used as a final polishing step for other secondary treatment systems, and ponds which include complete-mix aeration and sludge recycle or return since these systems are in essence a variation of the activated sludge process. Aerated ponds without sludge recycle, however, are eligible for adjustments provided the other specific requirements are met.

The amended suspended solids limitations were determined by statistical analysis of available data. The acceptable limit was defined as that concentration achieved 90 percent of the time by waste stabilization ponds that are achieving the biochemical oxygen demand limitations of 40 CFR 133.102(a). Each State was considered separately as well as appropriate contiguous geographic areas within a State or group of States. The analysis was done by the States or the applicable EPA regional office in cooperation with the States.

A considerable amount of latitude was allowed in developing these values to account for varying conditions affecting pond use and performance across the country. Categorizations within States based on factors such as geographic location, seasonal variation and the type of pond were permitted. In some instances, the values presented below reflect these factors.

In accordance with the amended regulation, a single value corresponding to the concentration achievable 90 percent of the time may be used to establish the suspended solids limitations for ponds within a State. The concentration achievable 90 percent of the time has been generally accepted as corresponding to a 30 consecutive day average (or an average value over the period of discharge when entire duration of the discharge is less than 30 days). This interpretation is consistent with the analysis which was used as the basis for the other suspended solids and biochemical oxygen demand limitations contained in 40 CFR 133.

For this reason, a single suspended solid concentration has been listed below for ponds (or subcategory of ponds) within a State. In some cases, however, the States and EPA regional offices have agreed upon additional values, such as weekly averages or daily maximums, which will be used for compliance monitoring purposes within those States.

In some cases the data base for the analysis was quite limited and in all cases additional data are being collected. A periodic reevaluation of this expanding data base will be conducted and could result in further changes in the suspended solids limitations listed below. Several EPA regional offices have already indicated their intent to conduct a reevaluation within 2 years or less. Even though publication of these values is not a formal rulemaking procedure, public comments are welcome and will be considered in any revisions. Comments should be submitted to Director, Municipal Construction Division (WH-547), Environmental Protection Agency, Washington, D.C. 20460.

FOR FURTHER INFORMATION CONTACT:

Sherwood Reed or Alan Hais, Municipal Construction Division (WH-547), Office of Water Program Operations, Environmental Protection Agency, Washington, D.C. 20460, 202-426-8976.

Dated October 27, 1978.

THOMAS C. JORLING,
*Assistant Administrator for Water and Waste Management.*

ENVIRONMENTAL PROTECTION AGENCY

SUSPENDED SOLIDS LIMITATIONS FOR WASTEWATER TREATMENT PONDS **

*Location and Suspended Solids Limits (mg/l)*

Alabama—90.
Alaska—70.
Arizona—90.
Arkansas—90.
Califorinia—95.
Colorado
Aerated ponds—75.
All others—105.
Connecticut—N.C.
Delaware—N.C.
District of Columbia—N.C.
Florida—N.C.
Georgia—90.
Guam—N.C.
Hawaii—N.C.
Idaho—N.C.
Illinois—37.
Indiana—70.
Iowa

*Controlled Discharge, 3 Cell and Case-by-Case but not Greater Than 80*

All others—80.
Kansas—80.
Kentucky—N.C.
Louisiana—90.
Maine—45.
Maryland—90.
Massachusetts—N.C.
Michigan
Controlled seasonal discharge
Summer—70.
Winter—40.
Minnesota—N.C.
Mississippi—90.
Missouri—80.
Montana—100.
Nebraska—80.
North Carolina—90.
North Dakota
North and east of Missouri River—60.
South and west of Missouri River—100.
Nevada—90.
New Hampshire—45.
New Jersey—N.C.
New Mexico—90.
New York—70.
Ohio—65.
Oklahoma—90.
Oregon
East of Cascade Mountains—85.
West of Cascade Mountains—50.
Pennsylvania—N.C.
Puerto Rico—N.C.
Rhode Island—45.
South Carolina—90.
South Dakota—110.
Tennessee—100.
Texas—90.
Utah—N.C.
Vermont—55.
Virgina
East of Blue Ridge Mountains—60.
West of Blue Ridge Mountains—78.
Eastern Slope Counties: Loudoun, Fauqu Rappahannock, Madison, Green, Al marle, Nelson Amherst, Bedford, Fra lin, Patrick and. *Case-by-Case applicat of 60/78 Limits*
Virgin Islands—N.C.
Washington—75.
West Virginia—80.
Wisconsin—60.
Wyoming—100.
Trust Territories and North Marianas—N

NOTES.—N.C.—No change from exist criteria.

** The values set for Iowa and Virginia incorporate a specific case-by-case provisions; however, in accordance with 40 CFR 133.133.103(c), adjustments of the suspended solids limitations for individual ponds in all States are to be authorized on a case-by-case basis.

[FR Doc. 78-32022 Filed 11-14-78; 8:45 a

# Appendix B

## State/Federal Water Quality Criteria

Table 1a. State Numeric criteria.

| PARAMETER | AQUATIC LIFE ACUTE | AQUATIC LIFE CHRONIC | AGRICULTURE LIVESTOCK | AGRICULTURE IRRIGATION | PUBLIC HEALTH FOOD PROCUREMENT | PUBLIC HEALTH DOMESTIC WATER SUPPLY |
|---|---|---|---|---|---|---|
| RADIONUCLIDES (pCi/L) | | | | | | |
| gross beta radioactivity | a | a | a | a | a | 50 |
| gross alpha particles including radium-226, but not radon or uranium | a | a | a | a | a | 15 |
| radium 226 and 228 combined | a | a | a | a | a | 5 |
| strontium 90 | a | a | a | a | a | 8 |
| tritium | a | a | a | a | a | 20,000 |
| METALS (µg/L) | | | | | | |
| antimony, total | 88 | 30 | a | a | 4,300 | 6 |
| arsenic, total | a | 50 | 200 | 100 | 20.5 | b |
| arsenic (III) | 360 | 50 | a | a | b | b |
| arsenic (V) | 850 | 48 | a | a | a | a |
| barium | a | a | a | a | a | 2,000 |
| beryllium, total | 130 | 5.3 | a | 100 | 0.13 | 4 |
| boron, total | a | a | 5,000 | 750 | a | a |
| cadmium, total | table 1b | table 1b | 20 | 10 | 170 | 5 |
| chromium, total | a | 40 | 1,000 | 100 | a | 100 |
| chromium (III) | table 1b | table 1b | a | a | 3,433,000 | 50 |
| chromium (VI) | 15 | 10 | a | a | 3,400 | 50 |
| copper, total | table 1b | table 1b | 500 | 200 | a | 1,300 |
| lead, total | table 1b | table 1b | 100 | 5,000 | a | 15 |
| mercury, total | 2.1 | 0.012 | 10 | a | 0.146 | b |
| nickel, total | table 1b | table 1b | 500 | 200 | 100 | 100 |
| selenium, total | 20 | 5 | 50 | 20 | 6,800 | 50 |
| selenium (V) | 11.2 | a | a | a | a | a |
| silver, total | table 1b | a | a | a | a | 50 |
| thallium, total | 1,400 | 40 | a | a | b | 2 |
| zinc, total | table 1b | table 1b | 25,000 | 2,000 | a | a |
| OTHER INORGANIC SUBSTANCES (µg/L) | | | | | | |
| ammonia | table 1c | table 1c | a | a | a | a |
| asbestos (µfibers/L) | a | a | a | a | a | 7,000,000 |
| chloride | 860,000 | 352,000 | a | a | a | 250,000 |
| chlorine, total residual | 19 | 11 | a | a | a | a |
| cyanide (free) | 22 | 5.2 | a | a | 220,000 | 200 |
| fluoride | a | a | 2,000 | 1,000 | a | 2,000 |
| nitrate (as N) | a | a | a | a | a | 10,000 |
| nitrite + nitrate (as N) | a | a | 100,000 | a | a | 10,000 |
| phosphorus, elemental (white) | a | 0.1 | a | a | a | a |
| sulfate | a | a | 1,000,000 | a | a | 250,000 |

Table 1a. State Numeric criteria (continued).

| PARAMETER | AQUATIC LIFE ACUTE | AQUATIC LIFE CHRONIC | AGRICULTURE LIVESTOCK | AGRICULTURE IRRIGATION | PUBLIC HEALTH FOOD PROCUREMENT | PUBLIC HEALTH DOMESTIC WATER SUPPLY |
|---|---|---|---|---|---|---|
| ORGANIC SUBSTANCES (µg/L) | | | | | | |
| Benzenes .......................... | | | | | | |
| aminobenzene (analine) | 14 | 6.7 | a | a | a | a |
| benzene | 5,300 | a | a | a | 40 | b |
| chlorobenzene | 250 | 50 | a | a | 21,000 | 100 |
| dichlorobenzenes, total | 1,120 | 763 | a | a | 2,600 | a |
| o-dichlorobenzene | 1,120 | 763 | a | a | 2,600 | 600 |
| m-dichlorobenzene | 1,120 | 763 | a | a | 2,600 | b |
| p-dichlorobenzene | a | a | a | a | 2,600 | 75 |
| other chlorinated benzenes, total | 250 | 50 | a | a | a | a |
| 1,2,4-trichlorobenzene | 250 | a | a | a | a | 70 |
| 1,2,4,5-tetrachlorobenzene | 250 | 50 | a | a | 48 | a |
| pentachlorobenzene | 250 | 50 | a | a | 85 | a |
| hexachlorobenzene | 6.0 | 3.7 | a | a | 0.00074 | b |
| ethylbenzene | 32,000 | a | a | a | 28,718 | 700 |
| nitrobenzene | 27,000 | a | a | a | 1,900 | b |
| pentachloronitrobenzene | 250 | 50 | a | a | a | a |
| vinylbenzene (styrene) | a | a | a | a | a | 100 |
| Ethers ............................ | | | | | | |
| chloroalkyl ethers, total | 238,000 | a | a | a | a | a |
| bis(2-chloroethyl)ether | 238,000 | a | a | a | 1.36 | b |
| bis(2-chloroisopropyl)ether | 238,000 | a | a | a | 0.00184 | b |
| bis(chloromethyl)ether | 238,000 | a | a | a | 0.00184 | a |
| 2-chloroethyl vinyl ether | 360 | 120 | a | a | a | a |
| halogenated ethers, total | 360 | 122 | a | a | a | a |
| chloromethyl methyl ether | 238,000 | a | a | a | 0.00184 | a |
| 4,4'-dibromodiphenyl ether | 360 | 120 | a | a | a | a |
| hexabromodiphenyl ether | 360 | 120 | a | a | a | a |
| nonabromodiphenyl ether | 360 | 120 | a | a | a | a |
| pentabromodiphenyl ether | 360 | 120 | a | a | a | a |
| tetrabromodiphenyl ether | 360 | 120 | a | a | a | a |
| tribromodiphenyl ether | 360 | 120 | a | a | a | a |
| Halogenated Hydrocarbons .......... | | | | | | |
| chlorinated ethanes | | | | | | |
| 1,2-dichloroethane | 18,000 | 2,000 | a | a | b | b |
| 1,1,1-trichloroethane | 18,000 | a | a | a | 173,077 | 200 |
| 1,1,2-trichloroethane | 18,000 | 9,400 | a | a | 41.8 | b |
| tetrachloroethanes, total | 9,320 | a | a | a | a | a |
| 1,1,1,2-tetrachloroethane | 9,320 | a | a | a | a | a |
| 1,1,2,2-tetrachloroethane | 9,320 | 2,400 | a | a | 10.7 | b |
| pentachloroethane | 7,240 | 1,100 | a | a | a | a |
| hexachloroethane | 980 | 540 | a | a | 8.74 | b |
| chlorinated ethylenes, total | 11,600 | a | a | a | 1.85 | a |
| 1,1-dichloroethylene | 11,600 | a | a | a | 1.85 | b |
| cis-1,2-dichloroethylene | 11,600 | a | a | a | 1.85 | 70 |
| trans-1,2-dichloroethylene | 11,600 | a | a | a | 140,000 | 100 |
| trichloroethylene | 45,000 | 21,900 | a | a | 80.7 | b |
| tetrachloroethylene | 5,280 | 840 | a | a | 8.85 | b |

Table 1a. State Numeric criteria (continued).

| PARAMETER | AQUATIC LIFE ACUTE | AQUATIC LIFE CHRONIC | AGRICULTURE LIVESTOCK | AGRICULTURE IRRIGATION | PUBLIC HEALTH FOOD PROCUREMENT | PUBLIC HEALTH DOMESTIC WATER SUPPLY |
|---|---|---|---|---|---|---|
| chlorinated propanes/propenes | | | | | | |
| 1,2-dichloropropane | 23,000 | 5,700 | 9.0 | a | 39 | 5 |
| 1,3-dichloropropene | 6,600 | 244 | a | a | 14.1 | b |
| Other Halogenated Hydrocarbons .... | | | | | | |
| halogenated methanes, total | 11,000 | a | a | a | 15.7 | 100 |
| bromomethane | 11,000 | a | a | a | 15.7 | b |
| 1,2-dibromoethane | a | a | a | a | a | 0.05 |
| tribromomethane (bromoform) | 11,000 | a | a | a | 15.7 | b |
| bis(2-chloroethoxy) methane | 11,000 | a | a | a | 15.7 | a |
| bromodichloromethane | 11,000 | a | a | a | 15.7 | b |
| bromochloromethane | 11,000 | a | a | a | 15.7 | a |
| bromotrichloromethane | 11,000 | a | a | a | 15.7 | a |
| dibromochloromethane | 11,000 | a | a | a | 15.7 | b |
| dibromochloropropane | a | a | a | a | 15.7 | 0.2 |
| dibromodichloromethane | 11,000 | a | a | a | 15.7 | a |
| dichlorodifuoromethane | 11,000 | a | a | a | 15.7 | a |
| dichloromethane (methylene chloride) | 11,000 | a | a | a | 1,600 | 4.7 |
| trichloromethane (chloroform) | 28,900 | 1,240 | a | a | 15.7 | b |
| tribromochloromethane | 11,000 | a | a | a | 15.7 | a |
| trichlorofluoromethane | 11,000 | a | a | a | 15.7 | a |
| tetrachloromethane (carbon tetrachloride) | 35,200 | a | a | a | b | b |
| di(2-ethylhexyl)adipate | a | a | a | a | a | 500 |
| hexachlorobutadiene | 90 | 9.3 | a | a | 50 | b |
| hexachlorocyclopentadiene | 7 | 5.2 | a | a | 206 | 50 |
| vinyl chloride | a | a | a | a | 525 | 2 |
| Miscellaneous Organics ............ | | | | | | |
| dioxin (2,3,7,8 TCDD) | 0.01 | 0.00001 | a | a | 0.000000014 | b |
| isophorone | 117,000 | a | a | a | b | b |
| polychlorinated biphenyls, total | 2 | 0.014 | a | a | 0.0000079 | b |
| tributyltin oxide | 0.149 | 0.026 | a | a | a | a |
| Nitrogen Compounds ............... | | | | | | |
| nitrosamines, total | 5,850 | a | a | a | 1.24 | a |
| N-nitrosodibutylamine | 5,850 | a | a | a | 0.587 | a |
| N-nitrosodiethanolamine | 5,850 | a | a | a | 1.24 | a |
| N-nitrosodiethylamine | 5,850 | a | a | a | 1.24 | a |
| N-nitrosodimethylamine | 5,850 | a | a | a | 1.6 | b |
| N-nitrosodiphenylamine | 5,850 | a | a | a | 16.0 | b |
| N-nitrosodi-n-propylamine | a | a | a | a | 1.24 | a |
| N-nitrosopyrrolidine | 5,850 | a | a | a | 91.9 | a |
| acrylonitrile | 7,550 | 2,600 | a | a | 0.65 | b |
| benzidene | 2,500 | a | a | a | 0.000535 | b |
| 3,3'-dichlorobenzidine | a | a | a | a | 0.02 | b |
| 1,2-diphenyl hydrazine | 270 | a | a | a | 0.54 | b |
| Polynuclear Aromatic Hydrocarbons, total | a | a | a | a | 0.0311 | 0.2 |
| acenaphthene | 1,700 | 520 | a | a | a | 1200 |
| acenaphthylene | a | a | a | a | 0.0311 | a |
| anthracene | a | a | a | a | 0.0311 | b |
| benzo(a)anthracene | a | a | a | a | 0.0311 | b |

Table 1a. State Numeric criteria (continued).

| PARAMETER | AQUATIC LIFE ACUTE | AQUATIC LIFE CHRONIC | AGRICULTURE LIVESTOCK | AGRICULTURE IRRIGATION | PUBLIC HEALTH FOOD PROCUREMENT | PUBLIC HEALTH DOMESTIC WATER SUPPLY |
|---|---|---|---|---|---|---|
| benzo(a)pyrene | a | a | a | a | 0.0311 | b |
| benzo(b)fluoranthene | a | a | a | a | 0.0311 | b |
| benzo(g,h,i)perylene | a | a | a | a | 0.0311 | a |
| benzo(k)fluoranthene | a | a | a | a | 0.0311 | b |
| chrysene | a | a | a | a | 0.0311 | b |
| dibenzo(a,h)anthracene | a | a | a | a | 0.0311 | b |
| fluoranthene | 3,980 | a | a | a | b | b |
| fluorene | a | a | a | a | 0.0311 | b |
| ideno(1,2,3-cd)pyrene | a | a | a | a | 0.0311 | b |
| naphthalene | 2,300 | 620 | a | a | a | a |
| phenanthrene | 30 | 6.3 | a | a | 0.0311 | a |
| pyrene | a | a | a | a | 0.0311 | b |
| Phthalate Esters .................. | | | | | | |
| phthalates, total | 940 | 3 | a | a | a | a |
| butylbenzyl phthalate | a | a | a | a | 5,200 | 100 |
| di(2-ethylhexyl)phthalate | 400 | 360 | a | a | b | b |
| dibutyl phthalate | 940 | 3 | a | a | b | b |
| diethyl phthalate | a | a | a | a | b | 5 |
| dimethyl phthalate | 940 | 3 | a | a | 2,900,000 | b |
| Phenolic Compounds ................ | | | | | | |
| phenol | 10,200 | 2,560 | a | a | 4,600,000 | b |
| 2,4-dimethyl phenol | 1,300 | 530 | a | a | 2,300 | 540 |
| chlorinated phenols | | | | | | |
| 2-chlorophenol | 4,380 | 2,000 | a | a | 400 | 120 |
| 3-chlorophenol | a | a | a | a | 29,000 | a |
| 2,4-dichlorophenol | 2,020 | 365 | a | a | b | b |
| 2,4,5-trichlorophenol | 100 | 63 | a | a | a | a |
| 2,4,6-trichlorophenol | a | 970 | a | a | 3.6 | b |
| pentachlorophenol | table 1b | table 1b | a | a | 8.2 | b |
| 3-methyl-4-chlorophenol | 30 | a | a | a | a | a |
| nitrophenols, total | 230 | 150 | a | a | a | a |
| 2,4-dinitrophenol | a | a | a | a | 765 | b |
| 4,6-dinitro-o-cresol | a | a | a | a | 765 | b |
| Toluenes.......................... | | | | | | |
| toluene | 17,500 | a | a | a | b | 1,000 |
| dinitrotoluenes, total | 330 | 230 | a | a | 9.1 | a |
| 2,4-dinitrotoluene | 330 | 230 | a | a | 9.1 | b |
| xylene | a | a | a | a | a | 10,000 |
| PESTICIDES (µg/L) | | | | | | |
| acrolein | 68 | 21 | a | a | 780 | 320 |
| acrylamide | a | a | a | a | a | 0.01 |
| alachlor (lasso) | 760 | 76 | 100 | a | a | 2 |
| aldicarb | a | a | a | a | a | 3 |
| aldicarb sulfone | a | a | a | a | a | 2 |
| aldicarb sulfoxide | a | a | a | a | a | 3 |
| aldrin | 3 | 0.001 | 1 | a | 0.000079 | b |
| atrazine (aatrex) | 170 | 3 | a | a | a | 3 |
| bromoxynil (MCPA) | a | a | 20 | a | a | a |

Table 1a. State Numeric criteria (continued).

| | USE CATEGORY | | | | | |
|---|---|---|---|---|---|---|
| | AQUATIC LIFE | | AGRICULTURE | | PUBLIC HEALTH | |
| PARAMETER | ACUTE | CHRONIC | LIVESTOCK | IRRIGATION | FOOD PROCUREMENT | DOMESTIC WATER SUPPLY |
| carbaryl (sevin) | a | 0.02 | 100 | a | a | a |
| carbofuran (furadan) | a | a | 100 | a | a | 40 |
| chlordane | 2.4 | 0.0043 | 3 | a | 0.00048 | b |
| chlorpyrifos | 0.083 | 0.041 | 100 | a | a | a |
| 2,4-D | a | a | a | a | a | 70 |
| dacthal (DCPA) | a | 14,300 | a | a | a | a |
| dalapon | a | 110 | a | a | a | 200 |
| diazinon (spectracide) | a | 0.08 | 100 | a | a | a |
| DDT and Metabolites ............ | | | | | | |
| 4,4'-DDE (p,p'-DDE) | 1,050 | a | a | a | 0.00059 | b |
| 4,4'-DDD (p,p'-DDD) | a | a | a | a | 0.00084 | b |
| DDT, total | 1.1 | 0.001 | 50 | a | 0.000024 | b |
| dieldrin | 1.0 | 0.0019 | 1 | a | 0.000076 | b |
| dinoseb (DNBP) | a | a | a | a | a | 7 |
| diquat | a | a | a | a | a | 20 |
| disulfoton (disyston) | a | a | 100 | a | a | a |
| endosulfan, total | 0.22 | 0.056 | a | a | 159 | b |
| alpha-endosulfan | 0.22 | 0.056 | a | a | 2 | b |
| beta-endosulfan | 0.22 | 0.056 | a | a | 2 | b |
| endosulfan sulfate | a | a | a | a | b | b |
| endothall | a | a | a | a | a | 100 |
| endrin | 0.18 | 0.0023 | 0.5 | a | 0.76 | b |
| endrin aldehyde | a | a | a | a | 0.81 | b |
| epichlorohydrin | a | a | a | a | a | 4 |
| ethylene dibromide | a | a | a | a | a | 0.05 |
| fenchlorfos (ronnel) | a | a | 100 | a | a | a |
| glyphosate (roundup) | a | a | a | a | a | 700 |
| guthion | a | 0.010 | 100 | a | a | a |
| heptachlor | 0.52 | 0.0038 | 0.1 | a | 0.00021 | b |
| heptachlor epoxide | 0.52 | 0.0038 | 0.1 | a | b | b |
| hexachlorocyclohexane | 100 | a | a | a | a | a |
| alpha-HCH | 100 | a | a | a | 0.0031 | b |
| beta-HCH | 100 | a | a | a | b | b |
| delta-HCH | 100 | a | a | a | a | a |
| gamma-HCH (lindane) | 2 | 0.08 | 5 | a | 0.0625 | b |
| technical-HCH | a | a | a | a | 0.0414 | a |
| malathion | a | 0.10 | 100 | a | a | a |
| methoxychlor | a | 0.03 | 1000 | a | a | 40 |
| methyl parathion | a | a | 100 | a | a | a |
| metribuzin (sencor) | a | 100 | a | a | a | a |
| mirex | a | 0.001 | a | a | 0.000097 | a |
| oxamyl (vydate) | a | a | a | a | a | 200 |
| parathion | 0.065 | 0.013 | 100 | a | a | a |
| picloram (tordon) | a | a | a | a | a | 500 |
| propachlor (ramrod) | a | 8 | a | a | a | a |
| simazine (princep) | a | a | 10 | a | a | 4 |
| toxaphene | 0.73 | 0.0002 | 5 | a | 0.00073 | b |
| 2,4,5-T | a | a | 2 | a | a | a |
| 2,4,5-TP (silvex) | a | a | a | a | a | 50 |

a - criterion not available
b - US EPA has promulgated criterion for Kansas under the Code of Federal Regulations, Title 40, Part 131.36

Table 1b. Formulae for calculation of hardness-dependent aquatic life support criteria for chromium III and total cadmium, total copper, total lead, total nickel, total silver and total zinc and pH-dependent aquatic life support criteria for pentachlorophenol. A WER value of 1.0 is applied in the hardness-dependent equations for total metals unless a site-specific WER has been determined and adopted by the department in accordance with K.A.R. 28-16-28e(a) and K.A.R. 28-16-28f(f). Hardness values in metal formulae are entered in units of mg/L as $CaCO_3$. Pentachlorophenol formulae apply only over the pH range 6.5-8.5.

CADMIUM (ug/L):
acute criterion = WER[EXP[(1.1280*(LN(hardness)))-3.6867]]
chronic criterion = WER[EXP[(0.7852*(LN(hardness)))-2.715]]

CHROMIUM III (ug/L):
acute criterion = WER[EXP[(0.819*(LN(hardness)))+3.7256]]
chronic criterion = WER[EXP[(0.819*(LN(hardness)))+0.6848]]

COPPER (ug/L):
acute criterion = WER[EXP[(0.9422*(LN(hardness)))-1.700]]
chronic criterion = WER[EXP[(0.8545*(LN(hardness)))-1.702]]

LEAD (ug/L):
acute criterion = WER[EXP[(1.273*(LN(hardness)))-1.460]]
chronic criterion = WER[EXP[(1.273*(LN(hardness)))-4.705]]

NICKEL (ug/L):
acute criterion = WER[EXP[(0.846*(LN(hardness)))+2.255]]
chronic criterion = WER[EXP[(0.846*(LN(hardness))+0.0584]]

PENTACHLOROPHENOL (ug/L):
acute criterion = EXP[(1.005*pH)-4.830]
chronic criterion = EXP[(1.005*pH)-5.290]

SILVER (ug/L):
acute criterion = WER[EXP[(1.72*(LN(hardness)))-6.52]]

ZINC (ug/L):
acute criterion = WER[EXP[(0.8473*(LN(hardness)))+0.884]]
chronic criterion = WER[EXP[(0.8473*(LN(hardness)))+0.884]]

Table 1c. pH-dependent acute and chronic aquatic life support criteria for total ammonia. (Total Ammonia as N, mg/L)

| pH | Acute criteria | Chronic criteria |
|---|---|---|
| 6.50 | 48.8 | 3.480 |
| 6.75 | 43.3 | 3.330 |
| 7.00 | 36.1 | 3.080 |
| 7.25 | 27.9 | 2.700 |
| 7.50 | 19.9 | 2.280 |
| 7.75 | 13.3 | 1.760 |
| 8.00 | 8.40 | 1.270 |
| 8.25 | 5.20 | 0.863 |
| 8.50 | 3.20 | 0.568 |
| 8.75 | 2.01 | 0.374 |
| 9.00 | 1.32 | 0.254 |

Refer to Kansas Implementation Procedures for application of wintertime criteria and default low flow related to ammonia.

[Code of Federal Regulations]
[Title 40, Volume 12, Parts 87 to 135]
[Revised as of July 1, 1997]
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TITLE 40--PROTECTION OF ENVIRONMENT

CHAPTER I--ENVIRONMENTAL PROTECTION AGENCY (CONTINUED)

PART 131--WATER QUALITY STANDARDS

131.36c

(9) Kansas, EPA Region 7.

(i) All waters assigned to the following use classification in the Kansas Department of Health and Environment regulations, K.A.R. 28-16-28b through K.A.R. 28-16-28f, are subject to the criteria in paragraph (d)(9)(ii) of this section, without exception.

Section 28-16-28d
Section (2)(A)--Special Aquatic Life Use Waters
Section (2)(B)--Expected Aquatic Life Use Waters
Section (2)(C)--Restricted Aquatic Life Use Waters
Section (3)--Domestic Water Supply
Section (6)(c)--Consumptive Recreation Use.

(ii) The following criteria from the matrix in paragraph (b)(1) of this section apply to the use classifications identified in paragraph (d)(9)(i) of this section:

| Use classification | Applicable criteria |
| --- | --- |
| Sections (2)(A), (2)(B), (2)(C), (6)(C) | These classifications are each assigned all criteria in: Column B1, all except 9, 11, 13, 102, 105, 107, 108, 111-113, 115, 117, and 126; Column B2, all except 9, 13, 105, 107, 108, 111-113, 115, 117, 119-125, and 126; and |

| National Toxics Rule (NTR) Criteria footnoted in Table 1a. of K.A.R. 28-16-28e with a "b" | | |
|---|---|---|
| **Parameter** | **NTR Domestic $H_20$ Supply ($\mu g/l$)** | **NTR Food Procurement ($\mu g/l$)** |
| benzene | 1.2 | - |
| m-dichlorobenzene | 400 | - |
| hexachlorobenzene | 0.00075 | - |
| nitrobenzene | 17 | - |
| bis(2-chloroethyl)ether | 0.031 | - |
| bis(2-chloroisopropyl)ether | 1,400 | - |
| 1,2-dichloroethane | 0.38 | 99 |
| 1,1,2-trichloroethane | 0.6 | - |
| 1,1,2,2-tetrachloroethane | 0.17 | - |
| hexachloroethane | 1.9 | - |
| 1,1-dichloroethylene | 0.057 | - |
| trichloroethylene | 2.7 | - |
| tetrachloroethylene | 0.8 | - |
| 1,3-dichloropropene | 10 | - |
| bromomethane | 48.0 | - |
| tribromomethane (bromoform) | 4.3 | - |
| bromodichloromethane (dichlorobromomethane) | 0.27 | - |
| dibromochloromethane (chlorodibromomethane) | 0.41 | - |
| trichloromethane (chloroform) | 5.7 | - |
| tetrachloromethane (carbon tetrachloride) | 0.25 | 4.4 |
| hexachlorobutadiene | 0.44 | - |
| dioxin (2,3,7,8) | $1.3x10^{-8}$ | - |
| isophorone | 8.4 | 600 |

| | | |
|---|---|---|
| polychlorinated biphenyls, total (PCBs) | 0.00004 | - |
| N-nitrosodimethylamine | 0.00069 | - |
| N-nitrosodiphenylamine | 5 | 16 |
| acrylonitrile | 0.059 | - |
| benzidene | 0.00012 | - |
| 3,3'-dichlorobenzidine | 0.04 | - |
| 1,2-diphenyl hydrazine | 0.04 | 0.54 |
| anthracene | 9,600 | - |
| benzo(a)anthracene | 0.0028 | - |
| benzo(a)pyrene | 0.0028 | - |
| benzo(b)fluoranthene | 0.0028 | - |
| benzo(k)fluoranthene | 0.0028 | - |
| chrysene | 0.0028 | - |
| dibenzo(a,h)anthracene | 0.0028 | - |
| fluoranthene | 300 | 370 |
| flourene | 1,300 | - |
| ideno(1,2,3-cd)pyrene | 0.0028 | - |
| pyrene | 960 | - |
| di(2-ethylhexyl)phthalate | 1.8 | 5.9 |
| dibutyl phthalate (di-n-butyl phthalate) | 2,700 | 12,000 |
| diethyl phtalate | - | 120,000 |
| dimethyl phthalate | 313,000 | - |
| phenol | 21,000 | - |
| 2,4-dichlorophenol | 93 | 790 |
| 2,4,6-trichlorophenol | 2.1 | - |
| pentachlorophenol | 0.28 | - |
| 2,4-dinitrophenol | 70 | - |
| 4,6-dinitro-o-cresol | 13.4 | - |
| toluene | - | 200,000 |

| | | |
|---|---|---|
| 2,4-dinitrotoluene | 0.11 | - |
| aldrin | 0.00013 | - |
| chlordane | 0.00057 | - |
| 4,4'DDE (p,p'-DDE) | 0.00059 | - |
| 4,4'-DDD (p,p'-DDD) | 0.00083 | - |
| DDT, total | 0.00059 | - |
| dieldrin | 0.00014 | - |
| endosulfan, total | 0.93 | 2 |
| alpha-endosulfan | 0.93 | 2 |
| beta-endosulfan | 0.93 | 2 |
| endosulfan sulfate | 0.93 | 2 |
| endrin | 0.76 | - |
| endrin aldehyde | 0.76 | - |
| heptachlor | 0.00021 | 0.00021 |
| heptachlor epoxide | 0.0001 | 0.00011 |
| alpha-HCH | 0.0039 | - |
| beta-HCH | 0.014 | 0.046 |
| gamma-HCH (lindane) | 0.019 | - |
| toxaphene | 0.00073 | - |

# Appendix C

## Reasonable Potential Methodology

Attachment

## Region 6 Approach
## Determining Reasonable Potential

Region 6 has developed a procedure to extrapolate limited datasets to better evaluate the potential for the higher effluent concentrations to exceed a State water quality standard. Our method yields an estimate of a selected upper percentile value. We believe that the most statistically valid estimate of an upper percentile value is a maximum likelihood estimator which is proportional to the population geometric mean. If one assumes the population of effluent concentrations to fit a lognormal distribution, this relationship is given by:

$$C_p = C_{mean} * \exp(Z_p * \sigma - 0.5 * \sigma^2)$$

where: $Z_p$ = normal distribution factor at $p^{th}$ percentile

$\sigma^2 = \ln(CV^2 + 1)$

To calculate the maximum likelihood estimator of the 95th percentile, the specific relationship becomes:

$$C_{95} = C_{mean} * \exp(1.645 * \sigma - 0.5 * \sigma^2)$$

if CV is assumed = 0.6,
$\sigma^2 = .307$

The ratio of the estimated 95th percentile value to the mean ($C_{95}/C_{mean}$) is calculated :

$C_{95}/C_{mean} = 2.13$

A single effluent value or the geometric mean of a group of values is multiplied by the ratio to yield the estimate of the 95th percentile value.

The following table shows the ratio of the upper percentile to the mean for the 90th, 95th, and 99th percentiles

Ratio of Upper Percentiles to Geometric Mean

| Percentile | Z | $C_p/C_{mean}$ |
|---|---|---|
| 90 | 1.283 | 1.74 |
| 95 | 1.645 | 2.13 |
| 99 | 2.386 | 3.11 |

# EXAMPLE
# DETERMINING REASONABLE POTENTIAL
# REGION 6 PROTOCOL

The outcome of this approach is illustrated in the following example:

Assume a discharger has reported 3 effluent concentrations of cadmium [9 ug/l, 12 ug/l, 15 ug/l]. The discharge flow is 3 mgd, the receiving stream critical flow is 6.4 mgd. The ambient chronic standard for cadmium is 6 ug/l as total metal. Assume 100% mix at the point of discharge and that the upstream concentration of cadmium is nondetectable. Evaluate the potential of the discharge to exceed water quality standards by assessing the impact of the 95th percentile effluent cadmium concentration.

## 1. Estimation of 95th percentile (Regional Approach)

The geometric mean effluent concentration of 12 ug/l is used as a parameter to estimate the 95th percentile value, assuming a lognormal distribution and a coefficient of variation of 0.6.

$$C_{95} = C_{mean} * \exp(1.283 * \sigma - 0.5 * \sigma^2)$$

$$\sigma^2 = \ln(CV^2 + 1)$$

$$C_{95}/C_{mean} = 2.13$$

12 ug/l *2.13 = 25.6 ug/l

The 95th percentile effluent value is used to calculate the Instream Waste Concentration:

## 2. Determination of Instream Waste Concentration

$$Cd = [(Qr * Ca) + (Qe*Ce)]/(Qr + Qe)$$

where
Cd= ambient concentration of cadmium after mix (Instream Waste Concentration)
Qr=river flow
Qe=effluent flow
Ca=upstream concentration of cadmium
Ce= maximum effluent concentration of cadmium

$$Cd = [(6.4 \times 0) + (3\ mgd*26\ ug/l)]/(6.4\ mgd + 3\ mgd) = 8.2\ ug/l$$

The IWC of 8.2 ug/l exceeds the ambient standard of 6.0 ug/l, a limit would be placed in the permit.

Use of other Upper Percentiles

The 90th percentile effluent value would be estimated as follows:

12 ug/l * 1.74 = 21 ug/l cadmium

The IWC would be calculated:
[(6.4 x 0) + (3 mgd * 21 ug/l)]/(6.4 mgd + 3 mgd)
=6.6 ug/l cadmium

The 99th percentile effluent value would be estimated as follows:

12 ug/l * 3.11= 37 ug/l cadmium

The IWC would be calculated
[(6.4 x 0) + (3 mgd *37 ug/l)]/ (6.4 mgd + 3 mgd)
=12 ug/l cadmium

As one selects more extreme tail values at which to evaluate potential water quality exceedances, the reported effluent concentrations must decrease to conclude that the potential to exceed the standard is not present.

Dealing with Highly Variable Datasets

The example above assumes that the coefficient of variation, defined as the ratio of the standard deviation to the mean, is 0.6. If multiple effluent concentrations are reported which exhibit a large range between the highest and lowest values, the statistical variance of this population of numbers may well be greater than 0.6.

One can calculate the geometric mean of a group of numbers as follows:

1. Take the logarithm of each pollutant value.

2. Sum the logarithmically transformed values.

3. Divide the sum of transformed data by the number of measurements.

4. Express the geometric mean pollutant value by determining the antilog of the average of the logarithmically transformed values.

## Dealing with Large Datasets

When a larger dataset of pollutant measurements is available, one may not need to statistically estimate the upper range or 95th percentile as described above. It is suggested that the 95th percentile be determined from the data and compared to the statistical estimation, the larger of these values should be assumed as the reasonably potential concentration of the discharge.

# Appendix D

## Permitting Process

# Wastewater Permitting Process

## Kansas Department of Health and Environment

Bureau of Water